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Sertifikaat

Certificate

REPUBLIEK VAN SUID AFRIKA

REPUBLIC OF SOUTH AFRICA

PATENT KANTOOR
DEPARTEMENT VAN HANDEL
EN NYWERHEID

PATENT OFFICE
DEPARTMENT OF TRADE AND
INDUSTRY

Hiermee word gesertifiseer dat
This is to certify that

1 South African Provisional Patent Application No. **2003/8306** accompanied by a Provisional Specification was originally filed at the South African Patent Office on **24 October 2003**, in the name of **MISTY MOUNTAIN TRADING 19 (PTY) LIMITED** in respect of an invention entitled: **WARE-WASHING PROCESS.**

2. On 26 November 2003 a change of name from **MISTY MOUTAIN TRADING 19 (PTY) LIMITED** to **OZONE WASH (PTY) LIMITED** was recorded at the Companies Office.

3. The photocopy attached hereto is a true copy of the provisional specification and drawings filed with South African Patent Application No. **2003/8306.**

Geteken te **PRETORIA** in die Republiek van Suid-Afrika, hierdie **13** dag van **December 2004**

Signed at **PRETORIA** in the Republic of South Africa, this **13** day of **December 2004**

Registrar of Patents

PRIORITY DOCUMENT

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COMPLIANCE WITH RULE 17.1(a) OR (b)

REPUBLIC OF SOUTH AFRICA

PATENTS ACT, 1978

REGISTER OF PATENTS

OFFICIAL APPLICATION NO.	LODGING DATE : PROVISIONAL	ACCEPTANCE DATE
21 01 2003/8306	22 24 October 2003	43
INTERNATIONAL CLASSIFICATION	**LODGING DATE : COMPLETE**	**GRANTED DATE**
51	23	

FULL NAME(S) OF APPLICANT(S) / PATENTEE(S)

71 MISTY MOUNTAIN TRADING 19 (PTY) LIMITED

APPLICANTS SUBSTITUTED :	DATE REGISTERED
71	

ASSIGNEE(S)	DATE REGISTERED
71	

FULL NAME(S) OF INVENTOR(S)

-STIONS 18 · 11 · 2003

72 FLETCHER, Clive Robert

MACKAY, Donald Alexander

PRIORITY CLAIMED	COUNTRY	NUMBER	DATE
N.B. Use international abbreviation for country. (See Schedule 4)	33	31	32

TITLE OF INVENTION

54 WARE-WASHING PROCESS

ADDRESS OF APPLICANT(S) / PATENTEE(S)

3 Waterpas Street
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South Africa

ADDRESS FOR SERVICE	REF
74 D M Kisch Inc, 54 Wierda Road West, Wierda Valley, SANDTON	P27560ZA00

PATENT OF ADDITION NO.	DATE OF ANY CHANGE	
61		
FRESH APPLICATION BASED ON	**DATE OF ANY CHANGE**	

Form P.1

REVENUE PAID 24.10.03 INKOMSTE BETAAL

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PBHR 229

Form P.1

REPUBLIC OF SOUTH AFRICA
PATENTS ACT, 1978

APPLICATION FOR A PATENT AND ACKNOWLEDGEMENT OF RECEIPT

(Section 30 (1) - Regulation 22)

The grant of a patent is hereby requested by the undermentioned applicant on the basis of the present application filed in duplicate.

OFFICIAL APPLICATION NO		
21	01	2003/8306

DMK REFERENCE
P27560ZA00

FULL NAME(S) OF APPLICANT(S)

71	MISTY MOUNTAIN TRADING 19 (PTY) LIMITED

ADDRESS(ES) OF APPLICANT(S)

3 Waterpas Street
Isando Ext 3
South Africa

TITLE OF INVENTION

54	WARE-WASHING PROCESS		
	THE APPLICANT CLAIMS PRIORITY AS SET OUT ON THE ACCOMPANING FORM P2 The earliest priority claimed is		
	THIS APPLICATION IS FOR A PATENT OF ADDITION TO PATENT APPLICATION NO.	21	01
	THIS APPLICATION IS FRESH APPLICATION IN TERMS OF SECTION 37 AND BASED ON APPLICATION NO.	21	01

THIS APPLICATION IS ACCOMPANIED BY :

x	1a	A single copy of a provisional specification of 10 pages.
	1b	Two copies of a complete specification of pages.
	2a	Informal drawings of sheets.
	2b	Formal drawings of sheets.
	3	Publication particulars and abstract (form P8 in duplicate).
	4	A copy of figure of the drawings for the abstract.
	5	Assignment of invention (from the inventors) or other evidence of title.
	6	Certified priority document(s).
	7	Translation of priority document(s).
	8	Assignment of priority rights.
	9	A copy of form P2 and a specification of S.A. Patent Application. 21 01
x	10	A declaration and power of attorney on form P3.
	11	Request for ante-dating on form P4.
	12	Request for classification on form P9.
	13a	Request for delay of acceptance on form P4.
	13b	

DATED 24 October 2003

Patent Attorney for Applicant(s)

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74	D M Kisch Inc Inanda Greens Business Park 54 Wierda Road West Wierda Valley SANDTON

REGISTRAR OF PATENTS DESIGNS, TRADE MARKS AND COPYRIGHT
RECEIVED
OFFICIAL DATE STAMP
2003 -10- 24
REGISTRAR OF PATENTS
REGISTRATEUR VAN PATENTE, MODELLE, HANDELSMERKE EN OUTEURSREG

The duplicate will be returned to the applicant's address for service as proof of lodging but is not valid unless endorsed with official stamp.

D. M. Kisch Inc, Sandton

Form P.6

REPUBLIC OF SOUTH AFRICA

PATENTS ACT, 1978

PROVISIONAL SPECIFICATION
(Section 30 (1) - Regulation 27)

OFFICIAL APPLICATION NO.		LODGING DATE		DMK REFERENCE
21	01 2003/8306	22	24 October 2003	P27560ZA00

FULL NAME(S) OF APPLICANT(S)

71	MISTY MOUNTAIN TRADING 19 (PTY) LIMITED

FULL NAME(S) OF INVENTOR(S)

CORRECTIONS 18.11.2003

72	FLETCHER, Clive Robert MACKAY, Donald Alexander

TITLE OF INVENTION

54	WARE-WASHING PROCESS

WARE-WASHING PROCESS

Field of the Invention

This invention relates to a ware-washing process. More particularly, this invention relates to a ware-washing process that is conducted at low wash water temperatures.

Background to the Invention

In this specification, the use of the word "ware" is taken to mean items such as wares, cutlery and crockery, pots and pans, and associated items of tableware and eating utensils.

The success of conventional ware-washing processes and the associated use of conventional detergents tends to be found in their removal of common food soils under alkali conditions, using inorganic alkali. While these processes remove a large number of fats, proteins and sugars, due to the solubility of such soils in water, it is well documented that these soils lend themselves, primarily, to removal under warm or even hot conditions. Industrial auto-warewashing is presently, conventionally a warm water multi-stage process, including a prewash stage (typically conducted at temperatures of 30°C – 40°C), a detergent wash stage (typically conducted at temperatures of 55°C – 65°C) and a rinse stage (typically conducted at temperatures of approximately 85°C). The current practice requires operation of washing machines at these relatively high temperatures in order to ensure, first, the breaking of chemical and/or physical bonds between the soils and the item to be washed and, second, the precipitating out of solution of those soils via a chelation or sequestration process.

In this specification, the term "warm water washing" is understood to mean washing at temperatures typically in the range 30°C – 85°C, while the analogous term "cold water washing" is understood to mean washing at temperatures typically in the range 10°C – 25°C.

Use of conventional detergents in warm water washing has several well-documented disadvantages. For example: the rate of foaming of a chemical detergent, typically, is proportional to the wash water temperature employed. Accordingly, higher wash water temperatures result in greater foaming, which is an undesired result mechanically, for example, in the warewashing industry.

A further disadvantage of conventional warm water washing detergents is the increased energy-consumption associated with generating hot water, as well as the increased down-time and maintenance of washing machine components, including boilers and elements, that is required, relative to cold-wash machines.

Another disadvantage associated with warm water washing processes is the fact that they tend to generate relatively hot to humid conditions in the machine, which conditions are conducive to the sustainability of various forms of bio organisms such as bacteria, algae, fungi and moulds. These same conditions also create a habitable environment that is favoured by pests such as cockroaches. Accordingly, warm water warewashing processes tend to lend themselves to at least some objectionable, unhygienic consequences.

The use of biocides in a warm water washing process is known. It is known that, while ozone is an effective biocide against bacteria and algae, ozone also has several inherent difficulties, including the fact that it is highly reactive, and that it is difficult to localise, since it is a gas at ambient temperatures. For these reasons, ozone has yet to be considered for successful use or used as a biocide in the warewashing industry.

Object of the Invention

It is an object of the present invention to provide a novel warewashing process that, it is believed, will overcome or at least minimize the disadvantages and difficulties associated with prior art as set out above.

Summary of the Invention

According to a first aspect of the invention, there is provided a cold water warewashing process including the steps of:

(i) washing the items in the warewasher in a cold water wash cycle; and

(ii) rinsing the items in the warewasher in a rinse cycle;

the process being characterised by the inclusion of the step of introducing a biocide into the washing cavity of the warewasher.

The biocide may be introduced in a gaseous phase.

The biocide is preferably ozone.

The biocide may be introduced at a temperature in the range 15°C – 25°C.

The biocide may be introduced at a pH range between 2 – 12.

The cold water warewashing process may include the step of pre-rinsing the items in the warewasher.

The cold water warewashing process may include the step of recycling the biocide-infused water into the washing cavity.

The cold water wash cycle may involve the step of using a warewashing detergent composition comprising:

- an inorganic caustic alkali; and
- a complexing agent,

the inorganic caustic alkali and the complexing agent combining to clean wares in a cold water washing process.

The warewashing detergent composition may be provided in the ratio of between 0.1% – 55% inorganic caustic alkali, between 0.1% – 45% complexing agent.

The inorganic caustic alkali component of the warewashing detergent composition may be a compound of the class of compounds selected from the group consisting of: alkali earth metal hydroxides, and any combination thereof.

The complexing agent may be a compound of the class of compounds selected from the group consisting of: complex phosphates, simple phosphates, amino-carboxylic acids, nitrolo triacetic acid (NTA), phosphonic acids, phosphonobutones, acrylates, and any combination thereof. Preferably, the complexing agent is NTA.

Preferably, the inorganic caustic alkali component of the warewashing detergent composition is sodium hydroxide, alternatively, potassium hydroxide.

The rinse cycle may involve the use of a rinse aid composition, preferably comprising:

- an alkoxylate; and
- an acid,

the alkoxylate and acid combining to rinse wares at low wash water temperatures and without streaking.

The low-temperature rinse aid composition may be provided in the ratio of between 0.1% – 90% alkoxylate, and between 0.1% – 25% acid.

The alkoxylate component of the rinse aid composition may be an alcohol alkoxylate.

The chain length of the alcohol alkoxylate component of the rinse aid composition may be varied between C_4 - C_{22}.

The degree of ethoxylation of the alcohol alkoxylate component of the rinse aid composition may be varied between 1 mole to 30 mole ethylene oxide. Preferably, the alkoxylate component of the rinse aid composition is an alcohol alkoxylate being 100% active with the cloud point of a 1% solution of temperature less than 22°C.

The acid component of the rinse aid composition may be selected from the group of acids consisting of: citric acid, acetic acid, sulfamic acid, phosphoric acid, and any combination thereof. Preferably, the acid component of the rinse aid composition is citric acid.

The Rinse Aid composition may include a dye.

According to a second aspect of the invention, there is provided the use of ozone in a cold water warewashing process. The cold water warewashing process preferably is as hereinbefore defined.

According to a third aspect of the invention there is provided a warewasher having a washing cavity, the warewasher including introduction means for introducing ozone into the washing cavity.

Detailed Description of the Invention

Without limiting the scope of the invention and by means of examples only, embodiments of the invention will now be described hereunder.

Example 1: Experimental Procedure for the Determination of the Efficacy of Ozone as a Biocide in Ware Washing

Each Formulation was evaluated using a Hobart F25 Warewashing machine.

More particularly, the Hobart F25 warewashing machine used had been modified by disconnecting the heating elements so that the warewashing process could only be carried out at ambient temperatures within the cold water washing range. The particular results discussed below were conducted and recorded at an ambient temperature of 17.4°C.

The Hobart F25 Warewashing Machine operated on a 6 minute warewashing process that included a pre-rinse cycle, a wash cycle and a rinse cycle. The detergent and rinse aid were both dosed automatically into the washing machine.

The solutions used were made up to the following concentrations:

- detergent: 50 ml in 50 l of water; and
- rinse aid: 5 ml in 20 l of water.

Uniform standard white dinner plates were used for the experiment. The rate of addition of ozone was 780 mg/hour giving less than 1 ppm concentration and the process of addition of the ozone into the washing machine during the 6 minute wash cycle was conducted at a rate of 780 mg per hour.

Bacteria counts were conducted before and after washing, the results of which are tabulated below in Tables 1 & 2. The trial achieved a kill rate of 100% of all bacteria detected.

Ozone Usage Trial in Warewashing Machines

Scope of trial

To determine the kill efficacy of ozone on selected bacteria in warewashing machine.

Bacteria used

- staphylococcus aureus;
- escherichia coli;.
- pseudomonas auruginosa;.
- bacillus subtilis;
- salmonella typhi; and
- listeria monocytogenes,

the above bacteria having been sourced from the following batches obtained from the South African Bureau of Standards.

- S. aureus (STA 53)
- E.coli (SABS TCC ESC 37)
- P.Aeruginose (PSE 16)
- B.subtillis (BAC 35)
- Salmonella (SAL 10)
- Listeria (LI 5)

<u>Testing Methodology and Tabulated Results</u>

1. The surface of the plate used to conduct the testing on was swabbed prior testing, and the plate washed with the cleansing aid known in the trade as T & C Chemical product 96210.
2. The surface of each plate on which testing was to be conducted was divided into two columns with 12 rows each.
3. The column on the left hand side was marked "Before Washing" and the column on the right hand side was marked "After Washing".
4. Loopfulls of each bacteria culture were placed and suspended into 5 ml separate aliquots of sterile milk, with each such aliquot being tested for the presence of antibiotics. Only those aliquots indicating a negative result for the presence of antibiotics were used in further experimentation.
5. Each row on each plate was inoculated with solutions of the respective bacteria-types specified above.
6. The plates were left to dry in an incubator for 10-15 minutes.
7. Each row in the column on the left hand side of the plate marked "Before Washing" was swabbed.

Table 1: Measured Bacteria Counts Before Washing

Swab Description	Total Aerobic Count SABS 763 Count/Area	Staph SGS 1TP:012 Count/Area	E.coli SGS 1TP:004 Count/Area	Pseudomon as spp OXOID 6^{th} EDD (1990) Count/Area	Bacillus Cereus SGS 1TP:011 Count/Area	Salmonella spp. 1TO:018 Count/Area	Listeria OXOID 6^{TH} Ed (1990) Count/Area
Swab 1	0						
Swab 2	0						
Swab 3		>3000					
Swab 4			214				
Swab 5				Present			
Swab 6					Present		
Swab 7						Present	
Swab 8							0
Swab 9							
Swab 10							
Swab 11							
Swab 12							
Swab 13							
Swab 14							

8. Plates were then washed in the warewashing machine in the presence of ozone, together with the compounds known conventionally in the industry as T & C Chemicals detergent products automatic warewashing aid (No. 92696) and T & C Chemicals automatic rinse aid (No. 92695), and left to dry.
9. After the wash cycle was completed, the plates was removed from the warewashing machine and the right hand side of each row in the "After Washing" column was swabbed.

Table 2: Measured Bacteria Counts After Washing

Swab Description	Total Aerobic Count SABS 763 Count/Area	Staph SGS 1TP:012 Count/Area	E.coli SGS 1TP:004 Count/Area	Pseudomon as spp OXOID 6^{th} EDD (1990) Count/Area	Bacillus Cereus SGS 1TP:011 Count/Area	Salmonella spp. 1TO:018 Count/Area	Listeria OXOID 6^{TH} Ed (1990) Count/Area
Swab 1							
Swab 2							
Swab 3							
Swab 4							
Swab 5							
Swab 6							
Swab 7							

Swab 8							
Swab 9		None Detected					
Swab 10			None Detected				
Swab 11				None Detected			
Swab 12					None Detected		
Swab 13						Absent	
Swab 14							0

Kill Rate Achieved during this Trial: 100%

Example 2: Description of the Cycles in a Preferred Cold Warewashing Process

The warewashing process used in the evaluation of the efficacy of ozone as a biocide in warewashers was a 6 minute cycle which included a pre-rinse cycle, wash cycle and rinse cycle. Both the detergent as well as the rinse aid (as described above) were automatically dosed into the machine at a rate of 50 ml per 20 l water for the detergent and 25 ml per 20 l water for rinse aid. The ozone was dosed into the machine in a vapour phase at a rate of 780 mg per hour. The ozone generating unit was designed to commence dispensing ozone into the washing machine on activation of the washing machine, and to cease operation when the washing cycle had been completed.

Example 3: Relative Performance Evaluation: Variable Rates of Introduction of Ozone into the Washing Machine

The experimental procedure as described in Example 1 were repeated, varying only the rate of addition of ozone into the washing machine from 500 mg per hour to 900 mg per hour. Consideration and comparison of the results obtained revealed that the optimum was found at 780 mg per hour.

It is worth noting that the bacterial load used in the experimental tests conducted were exceedingly high and such loads would not normally be found in practice and therefore the ozone value could be reduced significantly.

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The optimum dosages for the detergent and rinse aid were found, similarly, to be 50 ml per 20 l water and 25 ml per 25 l water respectively, although this could vary substantially depending on the degree of soiling and also bacterial load.

It will be appreciated that numerous embodiments of the invention may be performed without departing from the scope and spirit of the invention as defined in the consistory statements above.

Dated this 24 day of October 2003

Patent Attorney / Agent for the Applicant